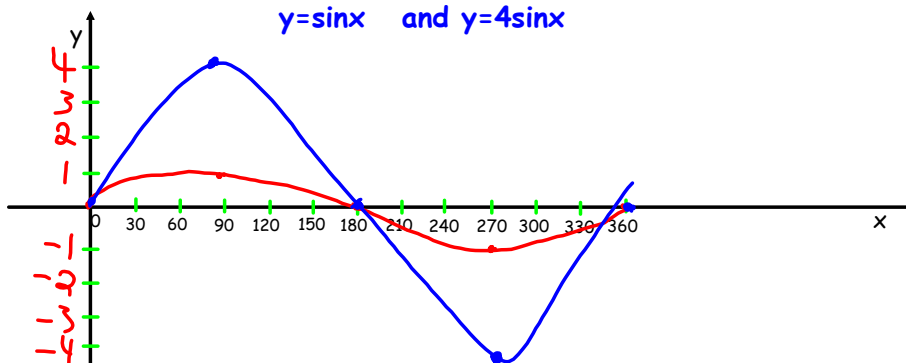


5.5 Transformation of the Sine Function**Transformation of the Sine Function**Recall $y = \sin x$ Key points: $(0^\circ, 0)$ $(90^\circ, 1)$ $(180^\circ, 0)$ $(270^\circ, -1)$ $(360^\circ, 0)$ Extra Points: $(30^\circ, 0.5)$ $(150^\circ, 0.5)$ $(210^\circ, -0.5)$ $(330^\circ, -0.5)$ Ex 1: Graph the following functions for one full cycle on the same grid: $y = \sin x$ and $y = 4 \sin x$ 

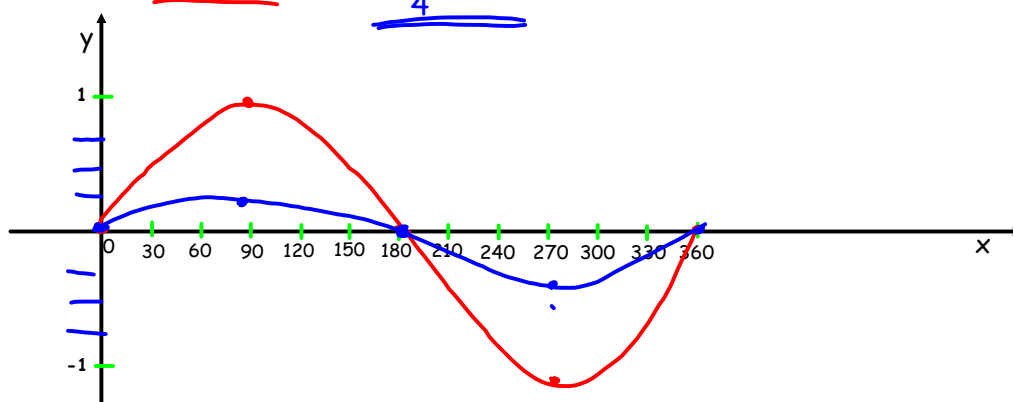
Compare the following functions by looking at the following characteristics:

 $y = \sin x$

- a) period 360°
 b) max 1
 c) min -1
 d) equation of the axis:
 $f(x) = 0$
 e) amplitude 1

 $y = 4 \sin x$

- a) period 360
 b) max 4
 c) min -4
 d) equation of the axis:
 $f(x) = 0$
 e) amplitude 4

Ex 2: Graph the following functions, for one full cycle, on the same grid: $y = \sin x$ and $y = \frac{1}{4} \sin x$ 

Compare the following functions by looking at the following characteristics:

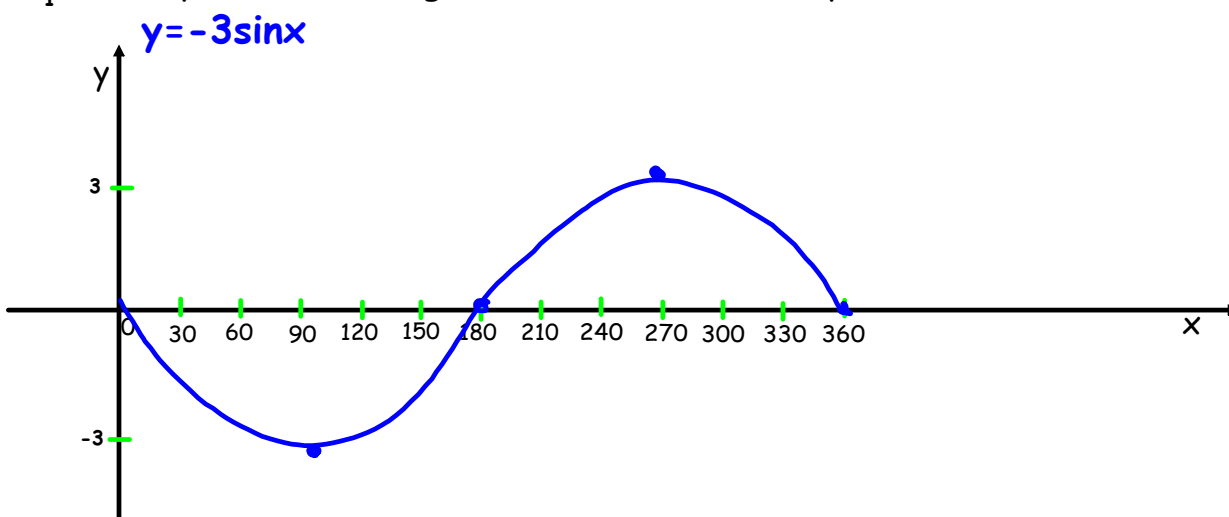
 $y = \sin x$

- a) period 360°
 b) max 1
 c) min -1
 d) equation of the axis:
 $f(x) = 0$
 e) amplitude 1

 $y = \frac{1}{4} \sin x$

- a) period 360
 b) max $\frac{1}{4}$
 c) min $-\frac{1}{4}$
 d) equation of the axis:
 $f(x) = 0$
 e) amplitude $\frac{1}{4}$

Ex 3: Graph the following function, for one full cycle:



List the characteristics:

$y = -3\sin x$

- a) period 360° b) max 3
 c) min -3 d) equation of the axis: $f(x) = 0$
 e) amplitude 3

Putting it all together:

Ex 4: Describe the following transformations and graph the functions:

a) $y = \sin(x - 30^\circ) + 1$

1. horizontal shift right 30°
2. vertical shift up by 1 unit

b) $y = 2\sin(x + 45^\circ) - 1$

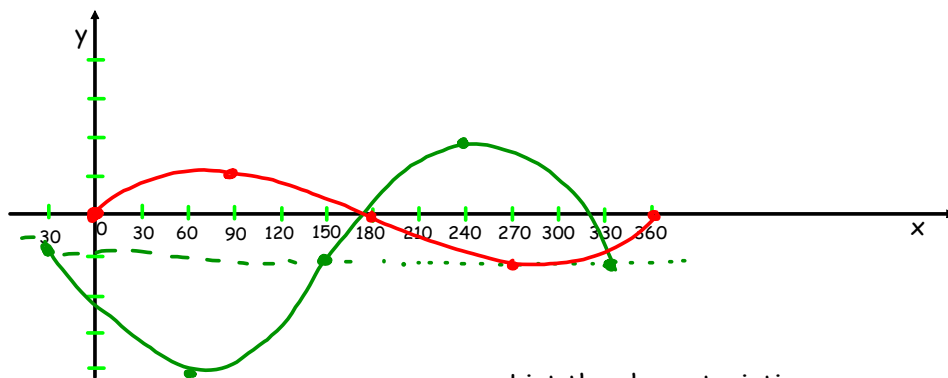
1. vertical stretch by a factor of 2
2. horizontal shift left by 45°
3. vertical shift down by 1 unit

In General:

$$y = a \sin[k(x - c^\circ)] + d$$

• Vertical stretch/compression
 • Reflection in axis if $a < 0$
 • horizontal left or right
 • vertical up or down

Ex 5: Graph $y = -3\sin(x+30^\circ) - 1$



List the characteristics:

a) period 360

b) max 2

c) min -4

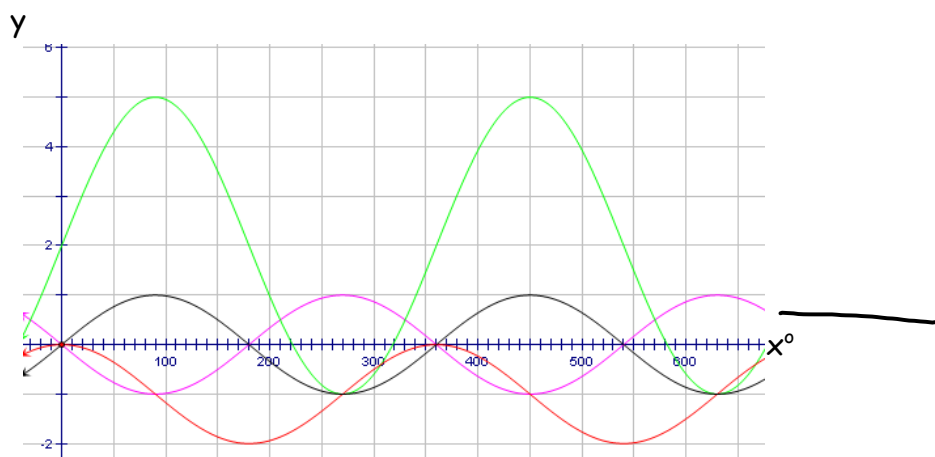
d) equation of the axis:

$$f(x) = -1$$

e) amplitude 3

$$D = \{x \mid -30 \leq x \leq 360, x \in \mathbb{R}\}$$

$$R = \{y \mid -4 \leq y \leq 2, y \in \mathbb{R}\}$$



Ex 6: Find the equations of each graph:

black: $y = \sin x$

pink: $y = -\sin x$

red: $y = -\sin(x-90) - 1$ OR $y = \sin(x+90) - 1$

green: $y = 3 \sin x + 2$

Assigned Work: p 373
#4, 5 cf, 6 cf, 7, 8, 13, 15, 16, 17

bef

unwind unit and transformwaves.GSP